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## THESIS

RETENTION IN THE NAVY NURSE CORPS

by

Penny B. Turner

December, 1990

Thesis Co-advisor:

Linda Gorman

Thesis Co-advisor:

Benjamin J. Roberts

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Retention in the Navy Nurse Corps

by

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of the requirements for the degree of

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## ABSTRACT

The current nationwide nursing shortage has intensified the focus on retention in the Navy Nurse Corps. This thesis examines some of the influences on a Navy nurse's decision to stay in or leave the service. The sample was selected from the 1987 Occupational Task Inventory of the Navy Medical Department, conducted by the Navy Occupational Development Analysis Center. The sample was restricted to nurses in the grades O-1 through O-4, who were stationed at naval hospitals at the time of the survey. The study uses a logistic regression model to predict the probability that a nurse will stay, given independent variables that measure nurse demand, patient contact, workload, and pay. The results suggest a need to examine the workload and incentive structure for Navy nurses.



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## I. INTRODUCTION

Retention of nurses in the Navy is rapidly becoming one of the major manpower issues facing the Nurse Corps today. Retention rates have started to fall just as the Nurse Corps, along with the rest of the Navy Medical Department, is starting to grow. Intensified recruiting efforts have succeeded in bringing more nurses into the Navy. However, the combination of a nationwide nursing shortage and additional billets recently opened up have made recruiting goals extremely difficult to meet. The problem is compounded by a decline in the Nurse Corps's normally high retention rates. Increasing losses in the junior ranks, particularly among nurses completing their first obligations, have developed over the past several years.

The specific reasons for the decline in retention are unclear. Surveys of both civilian and military nurses indicate that nurses leave organizations for a wide variety of reasons. This paper examines several factors related to a nurse's decision to remain in or leave the Navy. A better understanding of what influences that decision could help the Nurse Corps focus its retention efforts on initiatives with the highest potential for success.



## A. THE NURSING SHORTAGE

The Nurse Corps's problems with recruiting and retention stem partially from the current shortage in the civilian nurse labor market. Nursing shortages are not new in this country. Nurse supply and demand have only been in equilibrium twice since the 1940s. Cyclical shortages in the nurse labor market since World War II have always been caused by reductions in nurse supply, relative to demand. Nursing has always been a predominately female profession. In the past, women have routinely left nursing after a few years to follow cultural norms of raising families. High inflation rates in the 1970s caused many families to need a second wage-earner and brought many inactive nurses back into the labor force. Rapid salary growth for nurses and nursing education subsidies also boosted the supply of nurses by attracting students to the profession. Thus, supply grew to meet demand. In fact, since 1950 the growth in nurse supply has surpassed general population growth by 200 percent. [Ref. 1:p. 36]

In view of this growth in supply, the current nursing shortage, which began in the mid-1980s, is rather puzzling. Labor force participation has not declined. Almost 80 percent of registered nurses are currently working in nursing -- a rate much higher than that for teachers, another predominately

female profession [Ref. 2:p. 642]. This disputes the commonly held belief that the shortage is due to nurses leaving nursing. The present scarcity was actually triggered by an increase in the demand for nurses, rather than a reduction in supply. This increase in demand can be traced to the changing characteristics of illness and health care in our country, which have increased the requirements for bedside nursing care. Advancing medical technology has allowed Americans to live longer. Research has produced many cures for once fatal diseases. Unfortunately, with these advances has come an increased incidence of chronic illness, as some diseases are ameliorated, but not vanquished. This phenomenon, along with the AIDS epidemic, contributes heavily to an increased demand for nurses.

Another perplexing feature of the current nursing shortage is its existence in spite of hospital closures that have occurred due to reduced demand for inpatient beds. Medicare reform legislation in 1983 attempted to reduce federal health care expenditures by encouraging efficient health care practice with a system of prospective payment. Prior to the reform legislation, the amount of money paid to hospitals by Medicare was based on actual costs. It is now a fixed rate for each patient, based on a classification system called Diagnosis-Related Groups. The length of hospital stays has

dropped sharply since prospective payment went into effect. [Ref. 3:p. 24] Major medical insurance companies are trying to hold down costs with similar schemes. The result is that most hospitalized patients are sicker than in the past and require more complex nursing care. As hospitals discharge patients earlier, the need for home nursing care increases as well.

Another explanation for rising nurse demand is the increased substitution of nurses for non-nurses in hospitals. Nurses' wages normally increase more slowly than other health care workers, and the expanse of their education enables them to assume many of the responsibilities of other hospital employees. In the long run then, it is economically advantageous for hospitals to hire more nurses and reduce the number of other health care workers on the payroll (e.g., physical therapists, laboratory technicians, social workers, and medical clerks). [Ref. 2 :p. 643]

Signs of the current nursing shortage were present in 1985. Not only was health care changing, and nurse demand increasing, but the growth in the nurse supply was slowing. Nursing school enrollments were dropping, while the number of women enrolling in business and pre-medical curricula rose rapidly. As the shortage developed, the decline in traditional career interests began to permeate the nursing

profession. Hospitals are still the major employer of nurses. However, many opportunities now exist for nurses in the business community, both as consultants and entrepreneurs. Hospitals and nursing homes, because they offer the least attractive working conditions, are thus the hardest hit by the shortage.

For that reason, vacancy rates for full-time-equivalent budgeted nursing positions in hospitals are frequently used to measure this shortage. From 1985 to 1986, average vacancy rates increased from 6.5 percent to 13.6 percent [Ref. 4:p. 647]. Hospitals with 500 or more beds and those in urban areas reported the highest vacancy rates, while rural hospitals reported greater difficulty recruiting nurses. Some hospitals report being forced to close beds due to a shortage of nurses. [Ref. 5:p. V5]

Other indications of the shortage are the kinds of recruiting efforts undertaken by many hospitals in an effort to fill vacancies. Previously unheard of hiring incentives include: finders' fees to staff, relocation expenses, hiring bonuses as high as \$10,000 for critically short specialties, flex time, the Baylor plan, in which one works two 12-hour shifts on a weekend and receives pay for 40 hours, choice of shift with no rotation, and subsidized housing. Starting pay

has climbed rapidly as recruiting has become increasingly competitive. [Ref. 6:p. 34]

Pay is viewed as both a cause and an indicator of the nursing shortage. Nursing wages have historically been low and have responded sluggishly to shortage situations for a number of reasons. Some economists postulate that the nurse labor market is monopsonistic rather than competitive, since hospitals are the major employer of nurses. Others believe that the domination of the field by women has caused salaries to remain low. [Ref. 7:p. 47] But climbing vacancy rates have now created intense competition in the nurse labor market and have escalated wage rates -- an expected response to a shortage. A problem persists, however, with pay progression. The earnings curve for nurses is flat, compared to other professions. In 1987, salary progression for a staff nurse over a 6 year period was 39%, compared to 72% for a secretary or 193% for an accountant [Ref. 5:p. IV-24]. This wage compression may discourage those interested in nursing from entering the profession.

There is little indication that this nursing shortage will be easily or quickly resolved. The complexity of the current situation makes it difficult to pinpoint specific causes to correct. Demographic projections indicate there will be fewer high school graduates in the next several years. The

resulting decline in college enrollments, combined with the decreased interest in nursing, points to a bleak picture for the profession. Assuming salary progression is no more rapid in the future than it has been in the past, the projected demand for nurses by the year 2000 is twice the projected supply [Ref. 7:p. 39].

As the nursing shortage continues, its effect on health care becomes more detrimental. In December 1987, the Secretary of the Department of Health and Human Services appointed a 25-member panel to examine reports of widespread nursing shortages. The Secretary's Commission on Nursing expressed concern that "...the shortage of RNs is affecting the quality of patient care, the work environment for RNs, and access to health services." [Ref. 5:p. V-1] The shortage in hospitals has resulted in a work overload, which causes a detrimental effect on morale. Turnover is increasing as nurses search for better working conditions. Bed closures due to staff shortages are decreasing the accessibility to health care. Elective surgeries are frequently delayed, and even emergency admissions must sometimes await bed availability. [Ref. 5]

### **B. THE SHORTAGE AND THE NURSE CORPS**

The civilian nurse shortage is affecting the Navy Nurse Corps. In recent years, recruiting has fallen short of its goals. The need for growth in the size of the Nurse Corps compounded the problem by increasing the number of billets to be filled through recruiting. The timing of the expansion is unfortunate, but several factors make it necessary. The military buildup in the early 1980s translated into a significant increase in the number of people eligible for military health care. Longer lifespans made possible by advancing technology mean there will be more retired beneficiaries demanding health care now than ever before. The Navy's shortfall in medical personnel has led to increasing referral of non-active duty patients to civilian health care facilities. Health care obtained in the civilian community is paid for by the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). The increased use of CHAMPUS benefits, combined with escalating medical costs nationwide, has presented major financial problems for the Department of Defense (DOD). In an effort to keep DOD budget totals down, CHAMPUS has been underfunded by as much as 20 percent over the last 6 years. The current shortfall is estimated at \$700-750 million. [Ref. 8] The Navy is trying to reduce CHAMPUS expenditures by bringing patients back into the less costly

costly military treatment facilities. This has increased the required numbers of Navy medical personnel, including nurses. Many Navy hospitals have been contracting expensive agency nurses to maintain staffing levels as an interim measure.

The Nurse Corps must now increase its number of nurses in the face of a fiercely competitive civilian nurse labor market. Accession goals have been increased in an effort to expand the Nurse Corps to 3,342 nurses by FY 1993.

[Ref. 9] Realizing this goal would be difficult to achieve, the Nurse Corps took several measures to boost accessions: recruiting through college ROTC programs, re-instituting the Medical Enlisted Commissioning Program, exercising voluntary recall to active duty, funding both graduate and undergraduate nursing students in return for obligated service, and offering accession bonuses.

Although these measures improved recruiting, the increased number of accessions in FY 1989 (353) fell short of the estimated 450 new nurses needed each year to meet the 1993 target. Consequently, the goal for FY 1990 was 615 accessions. By the end of FY 1990, only 392 additional nurses had been brought onto active duty. [Ref. 9] The Navy does not have the capability to match many of the hiring incentives of civilian institutions and therefore may continue to have difficulties realizing recruiting goals.



### C. RETENTION PROBLEMS

As recruiting becomes more difficult, retention becomes more important. Unfortunately, it too is problematic; retention has begun to drop in recent years. The Center for Naval Analyses (CNA) examined Nurse Corps retention in 1989 by looking at continuation rates.<sup>1</sup> Over the ten year period ending in 1989, aggregate continuation rates for the Nurse Corps have remained high, between 90 and 93 percent [Ref. 10]. Figure 1.1 shows a downward trend in aggregate rates over the past couple of years. The 1989 continuation rate for the Nurse Corps as a whole was 86 percent, down from 90 percent the previous year. A more drastic decline can be seen for nurses completing their initial obligations (YCS 3). The continuation rate for nurses completing three years of commissioned service has been steadily declining from a peak of 78 percent in 1985. The 1989 rate was 62 percent [Ref. 11]. These declining rates are leading to a gap in the force structure, and could eventually result in a critical lack of experienced nurses.

The causes of falling retention rates are debatable. Few studies have concentrated on military nurse retention specifically, and even fewer on the Navy Nurse Corps. Past

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<sup>1</sup> Continuation rates are percentages of nurses present at the beginning of a year who are still on active duty at the end of the year.

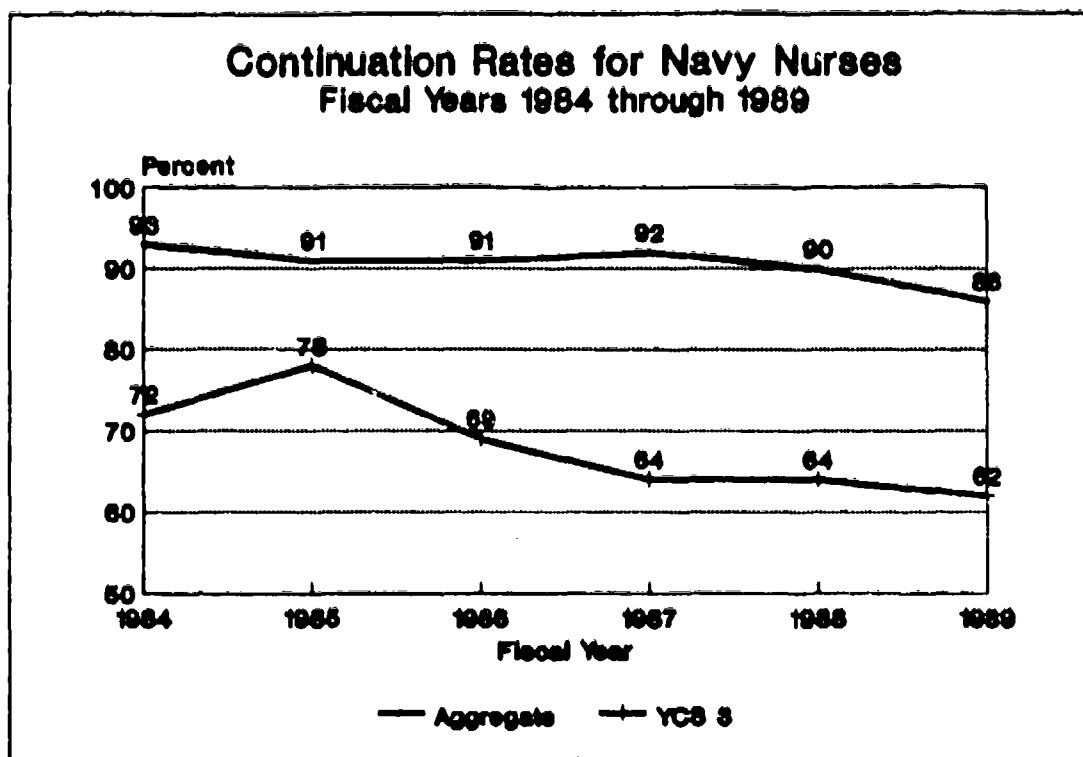


Figure 1.1

Source: Cooke, Timothy W., Navy Nurse Corps Retention: FY 1974 to FY 1988, Center for Naval Analyses, July 1989.

Cymrot, Donald J., Memorandum for the Deputy Chief of Naval Operations (Manpower, Personnel and Training),  
Subj: Nurses Continuation in FY 1989, 4 May 1990.

\*YCS=Years of Commissioned Service

studies of nurses, both military and civilian, have included a wide variety of reasons thought to contribute to the stay or leave decision. Surprisingly, compensation has seldom been a

significant factor; however, working conditions often influence the decision to stay or leave [Ref. 12].

The Nurse Corps is concerned about declining continuation rates and recently reactivated a Recruiting and Retention Task Force to study the problem. The Task Force produced 54 retention initiatives from 1987 to 1989 [Ref. 13]. While the extent of the list is impressive, many of the initiatives are conceptual changes that will render long-term, possibly indiscernible results. The Nurse Corps needs tangible solutions now.

The primary objective of this thesis is to determine what factors are important in Navy Nurse Corps retention. The study will examine the influence of compensation on the stay or leave decision, to determine if it follows the pattern of previous studies. The compensation structure for Navy nurses is fairly inflexible. Therefore, several variables are included which have been cited as important to job satisfaction and that the Nurse Corps may be able to influence. These are staff-to-patient ratio, number of hours worked, and the percent of total tasks that are related to patient care. Analysis through a logistic regression could provide additional insight into why nurses remain in or leave the Navy. The Nurse Corps has already taken several measures to increase retention. This study will assist policy makers

in determining if those measures will be effective, or if another focus is indicated.

## II. REVIEW OF LITERATURE

### A. INTRODUCTION

The current nursing shortage has generated intense interest in nurse retention. As the growth in nurse supply slows, and demand increases due to the changing characteristics of health care in this country, competition in nurse recruiting has become fierce. Many hospitals are placing an increased emphasis on retaining the nurses they already have. This heightened interest in retention is reflected in the nursing literature. Much of the discussion revolves around the concept of nurse turnover. Turnover refers to the movement of people into and out of an organization, and is sometimes measured by the number of people hired to replace those leaving within a specified time frame. However, the term is commonly used to describe employees who leave their jobs. The consequences of turnover for the organization include having an unfilled position, as well as the loss of the employee. The organization must either recruit and train a new employee to fill the position, or deal with the results of decreased capacity.

Most health care organizations view turnover as costly and therefore detrimental to the organization. Consequently, they

seek to reduce it. Therefore, the focus of much of the retention research is on the causes of turnover. There is a large literature on turnover, portions of which classify turnover, discuss the causes of turnover, and present various turnover theories. Understanding the issues in general turnover research will provide a theoretical framework from which to explore nurse turnover.

## B. EMPLOYEE TURNOVER

### 1. Turnover Classification

Turnover can be classified by its controllability, its measurement, and its effect on an organization, and may be categorized as either functional or dysfunctional. Functional turnover, so called because its organizational benefits outweigh its costs, can occur when an unproductive worker resigns, or is fired. Beyers, et.al., summarize functional turnover: "A certain level of turnover promotes innovation, improved adaptation to technology, savings in wages and seniority pay, and other benefits to an organization." [Ref. 14:p. 29] Dysfunctional turnover, which occurs when costs are higher than benefits, can occur when excessive recruiting, selection, and training costs result from a high degree of turnover. Turnover is also classified as voluntary

or involuntary. If an individual resigns, it is voluntary. Involuntary turnover occurs when an individual is fired. Most organizations are interested in the causes of voluntary turnover, since it frequently is also dysfunctional.

Lensing [Ref. 15:p. 17] notes that voluntary turnover may be further differentiated into controllable versus uncontrollable. Reasons for leaving that are related to ill-health or spouse relocation may not be under the organization's control. Care must be used when classifying turnover, since reasons for leaving that do not appear controllable may in fact be areas the organization could change. An example of this is an employee who cites family commitment as her reason for leaving because her work schedule is incompatible with family life. It might be that introducing more flexibility into the organization's work schedules could solve this problem.

The ability to measure and track turnover can be an important part of organizational management. Early recognition of turnover trends provides an opportunity to control them. As the profit motive is driving more health care organizations than ever before, the problem of measuring organizational turnover is beginning to receive more attention in the health care industry. However, the lack of standardized calculation methods presents a major difficulty

in comparing turnover rates. As Lensing shows, it is possible to derive six different turnover rates, ranging from 20 to 80 percent, using the same numbers and different methods of calculation [Ref. 15:p. 20].

Studies estimating turnover cost have an even wider variation. Jones notes estimations ranging "...from as little as \$1,280 to as high as \$50,000 per RN turnover." [Ref. 16:p.20] Some of this variation can be explained by the extensive training requirements in some nursing specialties. Other factors that may contribute to such a wide range are differences in regional economies, the differing levels of health care provided by various organizations, and differences in accounting structures. However, the lack of standardized calculation methods may cause organizations to over or underestimate actual turnover costs.

In one of the few recent studies on nursing turnover, Jones [Ref. 17] combined concepts from both the nursing and business literature to develop a conceptual framework in which she described turnover costs. Those costs may be classified as direct and indirect. Direct costs are those associated with filling a vacant job, such as recruiting, hiring, and the costs to the organization of the unfilled position. Indirect costs are more difficult to measure. They occur after a new employee has been hired to fill a vacant job, and include



orientation and training. Jones noted that another indirect cost involves decreased productivity in new employees. Mann [Ref. 18] used a human capital model to demonstrate the concept of a negative productivity value. He illustrates this concept with part of a formula used by one hospital to calculate initial investment costs in ICU nurses.

The formula at this hospital considers a new hire 50% effective during the first three months, 75% effective during the second three months, 80% effective during the third three months and 90% effective during the final three months of the first year. These percentages combine to a monthly average effectiveness of 73.75%. The complement, 26.25% "ineffectiveness," was applied to the median first year wages of new hires to estimate OJT costs as negative productivity. [Ref. 18:p. 11]

Jones also noted that low productivity in new employees costs the organization. She offered a formula similar to Mann's to calculate those costs.

The loss of skill and experience can be exceptionally difficult to quantify, yet that loss can have a debilitating effect on organizational effectiveness. The combination of decreased effectiveness and turnover costs usually means that the net costs to an organization will outweigh the benefits. Consequently, interest runs high in the causes of turnover.

## 2. Causes of Turnover

It is often assumed that voluntary turnover stems from an employee's dissatisfaction with a job. Lensing [Ref. 15:p. 18] demonstrated this is not necessarily true, since people may voluntarily resign when work schedules interfere with family commitments or because of the desire to go back to school. A better job offer might also persuade a person to resign, even if she is not dissatisfied with her current job. Nevertheless, research has shown a strong relationship between job satisfaction and turnover. Although theory has not established it as a causal relationship, the strength of the association has contributed to the prominence of job satisfaction as a research area in the fields of industrial and organizational psychology [Ref. 19:p. 395].

According to Muchinsky [Ref. 19:p. 399], there are four different perspectives on job satisfaction theory: intrapersonal comparison processes, interpersonal comparison processes, opponent-process theory, and the two-factor theory.

Intrapersonal comparison refers to a measuring process that occurs within each individual. People have standards that they use as a basis for judging a job. Some researchers believe that the standards are based on physical and

psychological needs similar to Maslow's hierarchy.<sup>2</sup> Others believe the standards are derived from human values. When individuals compare their perception of the job to their standards of what the job should be, the difference is the amount of satisfaction derived from the job. As the difference between the individual's standards and his perception of the job decreases, job satisfaction increases. The intrapersonal comparison theory is the most widely accepted approach to job satisfaction. [Ref. 19:pp. 399-400]

In contrast, the interpersonal comparison approach to job satisfaction asserts that individuals compare themselves to other people in determining how satisfied they are with a job. Muchinsky noted:

The idea that social factors influence feelings of satisfaction is intuitively appealing. Certainly a lot of research in social psychology indicates that we assess ourselves by our perceptions of others. It therefore is reasonable to assume that social comparisons operate in job satisfaction. [Ref. 19:p. 401]

The ideas embodied in the interpersonal comparison approach are the basis for "equity theory." An individual views his job according to the amount of input required on his part in order to achieve the benefits from the job. This ratio of

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<sup>2</sup> Abraham Maslow proposed that people are motivated by a hierarchy of needs. Individuals will seek to satisfy needs in an order of progression that begins with basic physiological needs, and moves through safety, social and self-esteem needs, finally to the need for self-actualization, or the realization of an individual's human potential. [Ref. 19: p. 450]

input to benefit is compared to the individual's perception of others' ratios. When an inequity is perceived in the comparison of the individual to another person, tension occurs, which leads to job dissatisfaction.

[Ref. 20:p. 16]

A much different approach to job satisfaction is the opponent-process theory, which proposes that satisfaction is based on the physiological responses of the central nervous system. The responses are produced as opposing processes to emotions. Whatever emotion the individual experiences, the central nervous system responses return the emotional state to neutral. Each time the opponent process occurs, it becomes stronger, causing the person to become more neutral about the job as time passes. While this theory would explain job boredom, it is too static to explain why feelings of job satisfaction increase with time, or why feelings of dissatisfaction intensify. The opponent-process theory has not gained any support from current research. [Ref. 19:p. 402]

A more popular, although controversial approach is Herzberg's two-factor theory. Herzberg proposed that aspects of work related to job content contribute to satisfaction, while context factors contribute to dissatisfaction. The content factors are termed satisfiers, because when they are present, they generate job satisfaction. Content factors are

concepts such as achievement, recognition, advancement and responsibility. On the other hand, context factors contribute to dissatisfaction with a job by their absence. Context factors pertain to the work environment, and include areas such as pay and working conditions. [Ref. 19:p. 403]

Herzberg's theory is rather simplistic, in that it does not explain why identical factors could result in different levels of job satisfaction for different people. Research has demonstrated that content and context factors are actually interrelated, and Herzberg's results have not been replicated. Another criticism is his use of self-reported job satisfaction data. The degree of subjectivity in his procedure leaves a large margin for error. Nevertheless, Herzberg's theory has been cited as an important contribution to job satisfaction research. [Ref. 19:p. 404]

Another important consideration in examining turnover is the extent of loyalty or commitment that an employee has to his employer. Organizational commitment is the degree of a person's identification with and involvement in an organization. The distinguishing features of commitment are: "... (1) strong belief in and acceptance of the organization's goals and values; (2) willingness to exert effort for the organization; and (3) desire to maintain membership in the organization." [Ref. 19:p. 382] The relationship of

organizational commitment to turnover has been emphasized in the literature only during the last decade.

Research has established more than 25 variables that are considered antecedents of organizational commitment. Mowday, et.al., extensively studied commitment by looking at the bonds between employees and their organizations. These bonds, or linkages, are established in an exchange between the individual and the organization.[Ref. 21:p. 16] Steers [Ref. 22] discussed how this exchange works. If an organization provides what an individual seeks -- that which fulfills needs or desires -- then organizational commitment is strengthened. Strong linkages are important from the organization's perspective, because stronger linkages result in lower employee absenteeism and turnover, which in turn lead to reduced costs and higher productivity [Ref. 21:p. 4].

Lindner and Davis [Ref. 23:p. 19], in a review of turnover literature, noted that recent research on organizational commitment focuses on the dynamic nature of the work environment. The rapid changes in our society affect the way we affiliate with organizations. Those changes can be grouped into four classifications: socionormative, demographic, economic, and technological changes [Ref. 21:p. 8].

Socionormative changes involve society's changing ideas of acceptable behavior. Socionormative values affect the work environment through the behavior of employees. Their behavior is influenced in several ways, including the socialization process up to the time of employment, the normative beliefs of other workers, and each individual's knowledge of what is happening in society. As society's norms change, the work environment is affected by changes in such areas as work ethic, attitudes toward authority, sex-role relationships, and trust in organizations. Kerr (1979) notes an "...American cultural evolution in the work force." He believes that people now place greater emphasis on personal self-fulfillment and individual rights. [Ref. 21:p. 9]

Organizational commitment is also affected by the changing demographics of the labor force. United States labor force composition has shifted to include a much larger percentage of women and minorities than in the past. Educational levels have increased, and the average age is changing as the baby boomers age. These factors affect people's expectations about their jobs. [Ref. 21:p. 10] Mowday, et.al., noted:

These changing expectations, or aspirations, will in turn affect the types of incentives and the types of supervision that will be effective. They will also affect the amount of outcomes and opportunities that will be desired -- and, in many cases, demanded. [Ref. 21:p. 10]

The overall economic environment surrounding the organization has some strong short-term and more subtle, enduring, long-term effects on employee-organization linkages. The relative prosperity of the economy affects job availability, which in turn can have a potent effect on an employee's incentive to remain with an organization or to seek other opportunities. [Ref. 21:p. 11]

Long-term economic effects are related to our society's increasing affluence and a sense of economic independence that is developing in multiple wage-earner households. Mowday, et al., maintained:

This relative economic 'independence' can in turn, be presumed to have an effect on an employee's willingness to join and stay with a particular organization, and also, to perform at an exceptionally high level. Likewise, although not strictly an economic effect, any organizational action (such as a job transfer) may be resisted because of a possible effect on the linked wage-earner. [Ref. 21:p. 11]

Multiple wage-earner families are becoming more common, and many households are economically dependent on a second wage-earner. This dependence could lead to increased turnover for organizations that frequently require employees to relocate.

Technological changes are also exerting a powerful influence on today's work force. Job obsolescence is one obvious effect of changing technology. Automation has reduced the manpower necessary in many organizations. As the complexity of business increases, many organizations



specialize more and often hire contractors for work previously performed within the organization. Employee mobility is also affected. Rapid changes in communication technology have moved our society into an "information age." With this new emphasis on information availability, people are much more aware of alternative job opportunities now than in the past. Changing technology has also increased specialization within the workforce. Specialization can be found in a wide range of activities, ranging from engineering to health care. This is causing a shift of employee focus from the organization to the profession. [Ref. 21:p. 12]

The trend toward decreased organizational commitment may seem to favor the individual at the expense of the organization. However, transferring from one organization to another may be difficult psychologically, especially if an individual's expertise is in skills that are specific to a particular organization. The "freedom" of reduced commitment may also have costs. Mowday, et.al., noted that:

...many individuals need to have an attachment to something. Depending on the other circumstances in their outside-of-work lives, it may not always be easy for some people to substitute other "somethings" for the work organization. Thus, a reduced feeling of attachment to an organization could have, though certainly need not have, some degree of adverse impact on one's psychological well-being. [Ref. 21:p. 14]

For this reason, the tendency toward weakened organizational linkages may foster increased attachment to professions or to groups existing outside of the work environment.

As the socionormative, demographic, economic and technological changes influence the work environment, employee-organization linkages tend to weaken significantly. The weakened linkages make it easier for an employee, both psychologically and economically, to leave an organization. Michaels and Spector [Ref. 24] established a definite connection between organizational commitment and turnover in a study of mental health employees. Commitment was measured with the Organizational Commitment Questionnaire, developed by Mowday, et.al.. A path analysis revealed that organizational commitment was a statistically significant predictor of turnover through intentions to quit.

### C. TURNOVER THEORY

Although job satisfaction and organizational commitment are the most widely cited causes of turnover, there are many others that have been studied. Researchers frequently use models to conceptualize these causes, and to provide a framework in which to examine the turnover process.

Mobley's turnover model is probably the most representative model of current turnover research. He

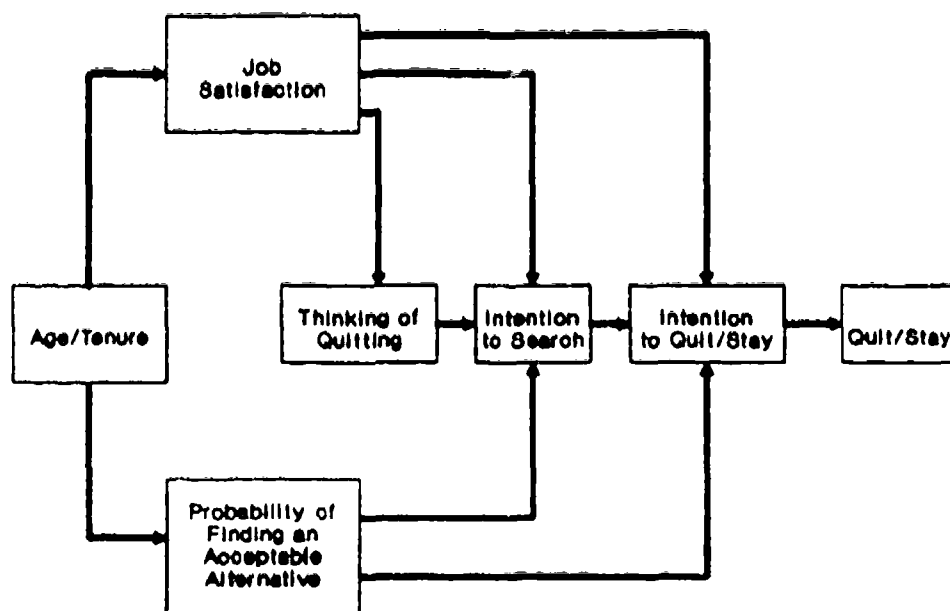
proposed the first version of this model in 1977, when he noted:

The relationship between job satisfaction and turnover is significant and consistent, but not particularly strong. A more complete understanding of the psychology of the withdrawal decision process requires investigation beyond the replication of the satisfaction-turnover relationship. [Ref. 25:p. 237]

His paper generated much research. Since 1977, Mobley and many others have tested variations of the model in an effort to explain turnover. Mobley's model differed from previous concepts in the proposal of intermediate steps between job satisfaction and the decision to quit [Ref. 25]. A version of Mobley's model, tested in 1978 by Mobley, et.al., is shown in Figure 2.1. It provides a good illustration of those intermediate steps. This model was tested with a sample of 203 hospital employees. Self-reported intention to quit was an important influence on turnover.

It was found that the single significant regression coefficient with turnover (among the variables studied) was intention to quit and that the effect of job dissatisfaction was on thinking of quitting and intentions rather than on turnover itself. [Ref. 26:p. 413]

In a study of National Guard members at decision points for re-enlistment, Miller, et.al., [Ref. 27] found that intention to quit was a strong, consistent, predictor of turnover. They noted that resignation occurs at a specific time in a military organization -- at the end of the contract,



Source: Mobley and others, "An Evaluation of Precursors of Hospital Employee Turnover," *Journal of Applied Psychology*, Vol. 5, No. 4, p. 410.

Figure 2.1

while the civilian point of resignation is not clear cut. They also found that intentions to quit were often formed at the time of enlistment. Dalessio, et.al., [Ref. 28] used path analysis and associated goodness-of-fit tests to re-analyze data sets from studies of the Mobley, et.al., model. Six data sets were examined, including those of Mobley, et.al., (1978), Miller, et.al., (1979), and Mowday (1980). Three of the Mobley, et.al., hypotheses were supported by this re-analysis: (1) the indirect effect of age on turnover through job satisfaction, (2) the indirect effect of job satisfaction on

turnover through intent to quit, and (3) that turnover was immediately preceded by intent to quit.

Price proposed a model similar to Mobley's in 1977. In 1981, Price and Mueller [Ref. 29] revised the model to include intent to stay as an intervening variable between job satisfaction and turnover. Figure 2.2 illustrates this causal model. Table 2.1 explains the 13 factors that produce variation in turnover. Only two of the 13 factors in this model are proposed to have a direct influence on turnover -- opportunity for alternative jobs and intent to stay. Intent to stay was hypothesized to be directly affected by job satisfaction, professionalism, generalized training, and kinship responsibility. Job satisfaction was hypothesized to be influenced directly by the remaining seven variables: routinization of tasks, participation, instrumental communication, integration, pay, distributive justice, and promotional opportunity.

This model was tested using multiple regression and path analysis on a sample of 1,091 non-supervisory registered nurses in seven midwestern hospitals. The results provided mixed support for the model. Intent to stay and opportunity had the strongest influences on turnover, as postulated.

[Ref. 29:p. 558] There were several statistically significant results from the path analysis. Intent to stay was affected

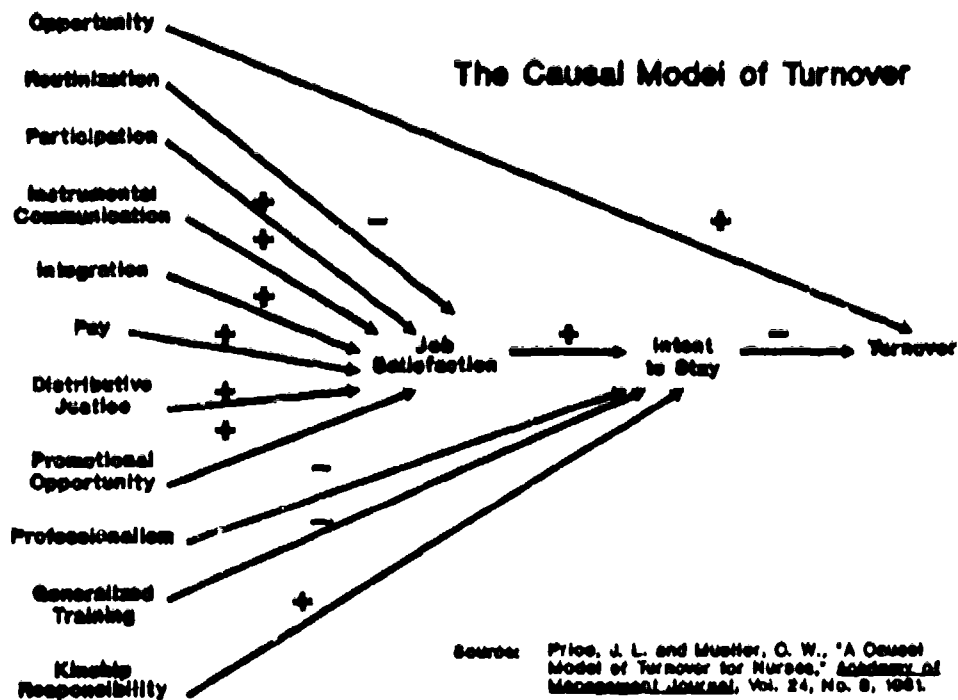


Figure 2.2

by opportunity for other jobs and general training, which had a negative effect, and by pay, kinship responsibility, job satisfaction, and length of service, which had a positive effect. Job satisfaction, the second intermediate variable, was influenced negatively by routinization, amount of time worked, and opportunity for other jobs, and positively, by participation, instrumental communication, promotional opportunity, and age. [Ref. 29:p. 554]

Price and Mueller's study therefore supported the work of Mobley and his colleagues, in that job satisfaction appears to be an indirect determinant of turnover, rather than a direct

**TABLE 2.1**  
**Price and Mueller's Determinants and Intervening Variables**

<u>Variable</u>	<u>Definition</u>
Opportunity	The availability of alternative jobs in the organization's environment.
Routinization	The degree to which a job is repetitive.
Participation	The degree of power that an individual exercises concerning the job.
Instrumental Communication	The degree to which information about the job is transmitted by an organization to its members.
Integration	The degree to which an individual has close friends among organizational members.
Pay	The amount of money, or equivalents, distributed in return for service.
Distributive justice	The degree to which rewards and punishments are related to the amount of input into the organization.
Promotional opportunity	The amount of potential movement from lower to higher strata within an organization.
Professionalism	The degree of dedication to occupational standards of performance.
General training	The degree to which the occupational socialization of an individual results in the ability to increase the productivity of different organizations.
Kinship responsibility	The degree of an individual's obligations to relatives in the community in which an employer is located.

Job satisfaction            The degree to which individuals like their jobs.

Intent to stay             The estimated likelihood of continued membership in an organization.

Source:     Price and Mueller, "A Causal Model of Turnover for Nurses," Academy of Management Journal, Vol. 24, No. 3, pp. 545-546.

influence, as previously argued in the literature. This study also supported the proposals by Mobley, Mowday and their colleagues that organizational commitment is important in turnover theory. Price and Mueller recommended replacing the variable "intent to stay" with "commitment." Another recommendation for future research was that gender should be included in the model, because some of the variables, such as integration, pay, promotional opportunity, professionalism, and kinship responsibility may differ in their effects on turnover by gender. [Ref. 29:pp. 560-561]

#### D. NURSING RESEARCH

The nursing literature contains a wide range of research on nurse turnover and retention. Exploring this research within the framework of the turnover models discussed above will provide a clarification of the issues. Known determinants of turnover have been included in most of the nursing studies. The ensuing discussion will first focus on



research on civilian nurse turnover and then review studies specifically directed toward military nursing.

### 1. Civilian Nursing

Much of the research on civilian nursing has examined two of the intermediate determinants of turnover: job satisfaction and intent to quit. Hinshaw, et.al., [Ref. 30] tested a complex causal model of turnover, using discriminant analysis on survey data from 1,597 nursing staff members working in both urban and rural hospitals. Interestingly, intent was a weak predictor of which nurses actually left, while it strongly predicted those who would stay. Job satisfaction only moderately predicted intent. The measurement of intent in this study may have contributed to the problems in prediction. Nurses were simply asked if they thought they would leave their present jobs at some unspecified time in the future. The turnover data were then examined one year later. A question to measure intent that included a one-year time frame may have yielded a better prediction. Choi, et.al. [Ref. 31] used multiple regression with path analysis to study a number of factors thought to influence the intent to stay or leave. They found job satisfaction to be the strongest predictor. Benedict, et.al., [Ref. 32] used survival analysis with a life table approach to explore causes of turnover. This demographic technique took into

account the length of time a nurse was employed by the organization. It allowed the researchers to examine retention trends, as well as causes. Job dissatisfaction stood out as the leading cause of employment termination.

Many researchers have explored potential causes and correlates of job satisfaction in nursing. Demographic variables, such as age and job tenure, are frequently included in turnover studies. Mobley, et.al., [Ref. 26] hypothesized that job tenure affected both job satisfaction and the probability of finding an alternative job. In their regression analysis on a survey of urban hospital employees, tenure had a significant, negative, effect on intent to search for another job and intent to quit. Price and Mueller [Ref. 29] found tenure to have an indirect influence on turnover through a positive effect on intent to stay. Blegan and Mueller found age to be highly correlated with satisfaction, and noted, "...the widely known phenomenon that older people are more satisfied with their jobs". [Ref. 33:p. 234]

Working conditions are persistently cited as a major source of job dissatisfaction among nurses. Prescott [Ref. 34] studied nurse vacancy problems, stability of employment, and nurse turnover among 1,044 staff nurses in six different regions of the country. Working conditions and

staff-to-patient ratios were strong predictors of all three. Both variables are also widely used measures of nursing workload. Blegan and Mueller [Ref. 33] studied job satisfaction in hospital staff nurses. In their factor analysis of survey data, workload, when perceived by nurses as "about right," had a statistically significant, positive influence on job satisfaction. Workload was measured in their study as the extent to which nurses felt that job demands were too little or too much.

Work schedule is a working condition that shows up consistently in reasons given by nurses for leaving jobs. Nursing work schedule problems are usually multi-faceted. Hospitals must provide nursing care around the clock. This necessitates shift work, an unpopular aspect of the job. The scheduling of time off and control over one's own schedule are also important to nurses.

The effects of shift work on the body's circadian rhythms have been well documented. Kostreva and Genevieve [Ref. 35] described symptoms of physical and psychological illness attributed to shift work which violates basic circadian principles. Harvey and Hannah [Ref. 36] studied the relationship between shift work, performance, and job satisfaction in a study of 50 registered nurses from a large urban hospital. A factor analysis of a questionnaire

containing measures of job satisfaction and performance on day and night shifts confirmed that nurses who were dissatisfied with the night shift reported more sleeping difficulties. In addition, work performance declined when these nurses worked nights. Blegan and Mueller [Ref. 33:p. 234] found that the effect of working the day shift, rather than evenings or nights, greatly increased job satisfaction. The work of Choi, et.al., [Ref. 31] examined the effect of work schedules on satisfaction. Working a shift other than days, including day-evening and day-night rotations, significantly decreased job satisfaction and increased intent to leave nursing. However, it did not increase intent to leave a particular nursing job.

Autonomy in the work place is frequently defined in the nursing literature as the opportunity to participate in decisions regarding one's job. It appears in many studies as a major determinant of job satisfaction. Recent literature has advocated decentralization of decision-making in hospitals, in order to allow more autonomy for nurses. Barhyte, et.al., [Ref. 37] explored the relationship between autonomy and job satisfaction, by measuring the effect of decentralization on job attendance. Significant relationships were found between increased levels of participation in decision-making and lower levels of absenteeism.

The manner in which employees are rewarded for their work, and the amount of those rewards, have a strong influence on job satisfaction. Pay is one of the rewards that has been heavily studied in nursing job satisfaction research, and researchers have reached conflicting conclusions about its importance. Neathawk, et.al., [Ref. 38] conducted a survey in which 416 hospital staff nurses were asked to rank-order factors contributing to job satisfaction. Pay and benefits were ranked as most important in four out of the five hospitals studied. Approximately half the responses indicated that nurses were dissatisfied with pay and benefits. However, in Blegan and Mueller's factor analysis, pay had little influence on job satisfaction. Instead, the perception that one is fairly rewarded for the work done (termed distributive justice in the Price/Mueller model) was a significant variable with a positive influence. [Ref. 33, In the Price and Mueller model, pay was only significant in determining intent to stay. Here, it also had a positive influence. Price and Mueller discussed the concern over the importance of individual variation in the determinants of turnover. They noted:

This emphasis is especially prominent in discussions of pay. The argument is that pay is only a significant determinant of turnover if it is highly valued. When it is not highly valued, it ceases to have an important impact on turnover. [Ref. 29:p. 549]

Career progression and professional development also play a role in determining job satisfaction. Promotion opportunity is a career development factor that is included in some of the turnover studies. Blegan and Mueller [Ref. 33] included this factor, and found it to be the second most important variable out of the 18 variables included in the factor analysis. Perceptions of higher promotional opportunity greatly increased job satisfaction. The authors noted that a short career ladder in hospital nursing might make this variable important.

The availability of attractive job alternatives was included in Price and Mueller's turnover model as a factor hypothesized to have a direct, positive influence on turnover. The path analysis confirmed that influence. The significance level and magnitude of the coefficient made this variable the second most important determinant of turnover. The authors noted that it was almost four times as important as pay. That importance was also due in part to the fact that it not only directly influenced turnover, but it indirectly affected it, through both job satisfaction and intent to stay. [Ref. 29] The work of Blegan and Mueller [Ref. 33] supported this finding, when opportunity for jobs outside the employing hospital had a statistically significant, negative effect on job satisfaction.

## 2. Military Nursing

Although the quantity of turnover research on military nurses has increased in recent years, it remains meager when compared to that on civilians. However, military nurse retention studies have examined many of the same factors thought to influence the stay or leave decisions of civilian nurses. Hilton [Ref. 12] surveyed Navy nurses to determine what factors affect the quality of work life. The survey response rate was 56 percent. Of those who responded, 14 percent reported that they intended to leave the Navy within the next two years. Accounting for retirement and mandatory separation, Hilton predicted a turnover rate of seven to ten percent for the following two-year period. His estimates were supported by the actual overall rates, which were approximately ten percent for the two years following the survey. [Ref. 39]

Job satisfaction in military nursing has been studied recently by several researchers. In 1988, the Air Force Nurse Corps studied job satisfaction and career intentions of its nurses, using a survey with a 56 percent response rate. Job satisfaction was measured on a standardized scale previously tested in job satisfaction literature. The analysis showed that job satisfaction was only slightly correlated with career intent for Air Force nurses. However, the study only measured

frequencies and correlations, and did not analyze the influence of satisfaction on intent. [Ref. 40] The Navy Nurse Corps conducted a survey in 1989, which asked Nurse Corps officers about their career intentions. If they were planning to leave the Navy, the nurses were requested to indicate their reasons for leaving, by choosing from a list of 11 reasons. "Not satisfied with Navy nursing role" was a reason chosen by 52.9 percent of the nurses responding to the question. [Ref. 41] While this answer deals with job satisfaction, it is a broad response to the question, and is open to interpretation. Thomas and Kocher [Ref. 42] included aspects of satisfaction with work and military life in their study of Army nurses. They found that this aspect of satisfaction had a positive and statistically significant influence on retention.

Factors shown to influence job satisfaction, and therefore turnover, have been included in many of the military nursing studies. Demographic factors, such as gender, race, marital status, and educational level are often included to gain insight into the turnover behavior of groups of nurses. In the 1988 Air Force study, "...males were more career-oriented than were females; married nurses were more career-oriented than were single nurses; there were no race differences." [Ref. 40:p. 8] Shigley [Ref. 43] studied the



career plans of military nurses, using data from the 1985 Department of Defense Officer and Enlisted Personnel Survey. Her analysis indicated that of the demographic variables examined, military rank, gender, and race were significant in explaining career decisions, while marital status, number of dependents, and education were not.

Working conditions appear to be as important to military nurses as they are to civilians. The 1988 Air Force survey found unstable duty schedules and too many additional duties as two of the top three reasons for attrition. Additionally, nurses were "...dissatisfied with the ratio of time spent in primary nursing duties versus other tasks that could be accomplished by less skilled personnel." [Ref. 40:p. 9] Hilton found similar problems in his Navy nurse survey. He noted: "...there was widespread evidence that many nurses perceive themselves to be both overworked and ineffectively scheduled on work shifts." [Ref. 12:p. 64] The more recent Navy Nurse Corps Survey asked nurses to indicate two things that, if changed, would keep them in the Navy. Of the nurses leaving, 22.2 percent answered more flexibility in working hours. [Ref. 41:Enc. 1,p. 11]

Autonomy remains an important factor in nurse retention, even in the more structured work environment of the military. Lensing [Ref. 15] analyzed the factors affecting the career

orientation of military nurses, using the 1978 Department of Defense Officer and Enlisted Personnel Survey, with stepwise discriminant analysis. The variable "having a say in what happens to me" was an important determinant of turnover. She noted, however, that the phrasing of the question in the survey left it open to interpretation, and the answers could not be narrowed down to specific working conditions.

The importance of pay to military nurses is rather uncertain. The 1990 Navy Nurse Corps Survey report listed as one of the top five reasons chosen for leaving, "higher paying nursing jobs elsewhere" [Ref. 41]. However, this could actually be related to the availability of attractive job alternatives, rather than pay itself. Kamin [Ref. 44] analyzed nurses' responses to the Officer Separation Questionnaire, which is administered to all active duty officers leaving the Navy. Out of a list of 30 possible reasons for leaving the Navy, pay ranked number 18. None of the other military nursing studies discussed above found pay to be a significant determinant of turnover.

Cooke [Ref. 45] studied Navy Nurse Corps compensation in 1989 and compared it with civilian pay rates. Historically, compensation for military nurses has been relatively greater than civilian nurse compensation. Cooke showed that this pay differential stems from early pay progression for military

nurses. Nurse Corps compensation increases three times faster than civilian nurse compensation during the first four years of service. After that period, the pay growth profiles are similar, if military retirement benefits are excluded. However, the relative advantage of military compensation is shrinking for two reasons. First, since 1983, civilian pay rates have been rising faster than regular military compensation (which excludes all special pays). Second, reduced promotion opportunity between 1983 and 1987 caused the relative military compensation to decline by 16 to 22 percent. Cooke used a logistic regression model to estimate the effect of relative compensation changes on retention. His results indicated that retention of nurses completing their first obligations would decline three to four percentage points for a relative pay decrease of \$1500 per year. He concluded that compensation changes have negatively affected recruiting much more significantly than retention.

Career development appears to have a strong influence on nurses' decisions to stay in or leave the military. The 1985 Department of Defense Officer and Enlisted Personnel Survey included a question to determine satisfaction with promotion opportunities. Thomas and Kocher [Ref. 42] analyzed data from Army nurses who answered this survey, using a logistic regression model. They found that satisfaction with

advancement opportunities had a significant, positive influence on the decision to stay. Shigley [Ref. 43] also used logistic regression on the same survey data to look at all military nurses as a group. She found that satisfaction with promotion opportunity influenced nurses to remain in the military and was statistically significant. Two studies specific to Navy nurses have noted a general dissatisfaction with aspects of career development. In Kamin's analysis of Officer Separation questionnaires, "poor promotion opportunities" was the number one reason that nurses cited for leaving the Navy [Ref. 44]. Hilton [Ref. 12] noted in his study that advancement opportunities and career planning were consistently viewed negatively by Navy nurses.

#### E. SUMMARY AND DISCUSSION

Organizations are interested in reducing voluntary employee turnover that is dysfunctional. The research on employee turnover indicates that the decision to remain in or leave an organization is a complicated process. There are many factors that influence the decision, either directly, or indirectly through an intermediate variable. Turnover research frequently focuses on factors that affect an intermediate variable, job satisfaction. This is because many

of the problems associated with job satisfaction are amenable to organizational change.

Interest in nurse turnover is renewed with each nursing shortage. The current shortage has generated another body of literature on nurse turnover and retention. Research indicates that, in general, the turnover decision for nurses differs little from that of other people. Demographic factors, the economic environment, working conditions, and career opportunity all play an important role in the stay or leave decision for nurses. Military nurses may not be influenced by the same kinds of factors that affect civilian nurses. Nursing in the military is quite different from nursing in the civilian sector.

Several factors contribute to the uniqueness of military nursing. One of the major factors is the expectation that the military nurse will fulfill the roles of both military officer and professional nurse. This dual role is emphasized even in the lowest ranks. Flexibility is highly valued in military nursing.

The nurse must be able to function in a variety of settings and be prepared to move on short notice from large teaching hospitals to basic field hospitals demanding combat care expertise, and to care for patients whose illnesses and injuries may result from foreign service or armed conflict. [Ref. 46:p. VIA6]

Several other factors make military nursing unique, and may either reduce the pool of qualified applicants or negatively

affect retention of nurses in the military. Guidelines are very specific regarding physical and educational requirements and age limits. Budgetary constraints and the military pay structure do not allow the military to respond quickly to fluctuations in supply or demand, either in the nurse labor market in general, or within the military health care system. Consequently, military nurses often work uncompensated overtime hours. No military officer receives over time pay, and military nurses are readily marketable in the civilian sector where overtime is compensated. [Ref. 46:p. VIA3-12]

The military work environment is more structured, hierarchical, and tradition-oriented than most civilian organizations. This can actually have opposing effects. The additional hierarchy can reduce autonomy even further. Diminished ability to control one's own work environment may make it more difficult to resolve problems with working conditions. That same hierarchy can, on the other hand, confer a kind of status and responsibility by virtue of rank. Some people may even prefer the certainty of hierarchical structure.

A final factor that contributes to the uniqueness of military nursing is the period of obligated service to which nurses agree upon entering the military. Initial contracts are usually for periods of three years or more. Therefore, it

is quite difficult for a nurse to resign during the first few years of service. After the initial contract expires, nurses are free to leave, unless they renegotiate another obligation (e.g., in return for specialized training). It is here that organizational commitment comes into play. The required initial obligation allows a prolonged period of exchange between the military and the nurse. This exchange establishes employee-organization linkages. The strength of the linkages between the Navy and its nurses may have been influenced by some of the same factors described by Mowday, et.al. [Ref. 21].

Socionormative changes are affecting the work environment in the Navy Nurse Corps. As the Nurse Corps expands its recruiting efforts, more nurses are coming onto active duty who have previous professional experience. The additional socialization in nursing prior to military affiliation may weaken the linkage between the nurse and the Nurse Corps. Steers [Ref. 22] recognized the potential for this type of effect when he noted that more highly educated people are less committed to organizations and perhaps more committed to a profession or trade. Hilton examined commitment of Navy nurses in his 1987 survey analysis. He noted that:

Senior nurses were significantly more committed to their careers than were junior nurses, whereas ... juniors were significantly more committed to the profession of nursing than they were to their Navy careers. [Ref. 12:p. 24]

Accelerating advances in medical research have also contributed to the aforementioned effects, and especially to a shift of commitment from the organization to the profession, because they change the level of education required to produce competent nurses. Nurses still need to understand basic nursing principles, and must learn to deal with a myriad of complex equipment. Now, however, the overall concepts about the etiology and treatment of disease are undergoing significant changes, as technology enables us to examine aspects of human physiology that were virtually unknown just a few years ago. Nurses are acutely aware of this and are increasingly seeking employment opportunities that help them expand and refine their skills.

The factors that determine job satisfaction may also differ between the military and civilian sectors. Many of the approaches to job satisfaction discussed above may be applicable to military nursing, but none completely explains the influences on a nurse's decision to stay in or leave military service. Muchinsky [Ref. 19:p. 407] noted that the concept of satisfaction results from a complex interplay of many factors, which vary in importance among individuals. It therefore seems reasonable to examine known determinants of turnover in light of stay or leave decisions made by Navy nurses over the past three years. Analysis of statistical



findings can lead to better insight into why nurses remain in or leave the Navy.

### III. SCOPE AND METHODOLOGY

#### A. DATA SET

The majority of the data for this study were obtained from two sources. The Navy Occupational Task Analysis Program (NOTAP) conducted an Occupational Task Inventory survey in 1987, which contained background and specific task information on Navy nurses. The initial sample for this thesis was the group of 998 nurses who responded to the NOTAP survey. Because the current study is interested in influences on the stay or leave decisions of relatively junior nurses, it was felt that any nurse who had attained the ranks of Commander (CDR) or Captain (CAPT) would be more highly motivated by the retirement annuity, and therefore had a high probability of remaining in the Navy until eligible for retirement. As a result, 172 nurses with the rank of CDR or CAPT were removed from the sample.

Next, observations were deleted if the nurses were not stationed at naval hospitals. Again, the focus of this study is on relatively junior nurses. Billets for Ensigns and Lieutenants (Junior Grade) are primarily in hospitals. The remaining sample had 702 nurses. A similar assumption led to the deletion of 40 additional nurses, whose subspecialty codes

indicated they were nurse anesthetists or nurse practitioners. The work environment and specific tasks of these nurses are radically different from those who are the focus of this thesis. It was beyond the scope of the study to examine retention influences by subspecialty area. Finally, three additional observations were dropped because of apparent designator coding errors. The subspecialty codes for those observations, and the responses to task significance questions, indicated the three respondents were physicians or dentists.

The data were then merged with files from the Bureau of Medicine Information System (BUMIS). BUMIS is a database that contains background information on all Medical Department officers. Data were provided by the Data Services Center, Bethesda, Maryland, on all nurses currently on active duty and on those who had left the Navy since September 1987. The data sets were merged by social security numbers. At this point, five observations were lost because of incomplete or missing social security numbers. Deleting nurses who left the Navy through retirement, or who were involuntarily separated, further reduced the sample by 55 nurses. An additional four observations were dropped to ensure that no nurses who were under obligation to remain in the Navy at the time of the

NOTAP survey were still serving under that same obligation. The final sample contained 595 nurses.

Additional information for this study was obtained from three other sources. Information on actual pay and allowances for these 595 nurses was obtained from the Joint Uniformed Military Pay System (JUMPS) files through Data Manpower Data Center, Monterey, California for the fiscal quarter ending September 1987. The American Hospital Association (AHA) provided information on hospital nursing vacancy rates. The AHA has, for the past several years, conducted random, nationwide, hospital surveys to determine the impact of the nursing shortage. Vacancy rates are based on the number of vacancies in full-time-equivalent positions for registered nurses. Vacancy rates were not computed in 1987, because of insufficient response to that particular survey. However, another survey was completed in April 1988 that provided vacancy rates, broken down by census regions. Finally, the Data Services Center in Bethesda supplied the 1987 Health Care Planning Matrix. The matrix is actually a database, which contains information on workload and staffing in naval hospitals.

## B. SPECIFICATION OF THE VARIABLES

As previously noted, the increased demand for nurses may be reflected in hospital vacancies of budgeted, full-time-equivalent positions for registered nurses. Vacancy rates do not fully measure the demand for nurses. The number of budgeted positions encompasses other factors, including budget constraints. However, the hospital industry does use vacancy rates to represent changing demand for nurses, and it appears to be a better measure of nurse demand than general unemployment rates. [Ref. 2:p. 642] Given that Navy nurses would be most acutely aware of job attractions in the area surrounding their current duty station, the April 1988 hospital nursing vacancy rates for specific census regions were used to reflect the strength of the civilian job market at each individual's duty station. The variable BSSACD6, from the NOTAP survey, was a code number that identified the duty station of each respondent. Each duty station was classified according to census region, and all duty stations in the same region were assumed to have the same vacancy rate. As vacancy rates ( $PEGVAC$ ) increased, the probability of staying was expected to decrease, since increased demand would influence civilian employers to offer increased hiring incentives. A variable representing the square of vacancy rates ( $REGVAC^2$ )

was added to account for the possible non-linear influence of vacancy rates.

Although pay has not been a significant factor in many previous studies, it remains theoretically important, and was therefore assumed to influence a nurse's decision to stay in or leave the Navy. The sign on the coefficient was expected to be positive. Actual pay and allowances were measured for each nurse by merging September 1987 pay records with the data set by social security numbers. The pay variable included base pay, basic allowance for quarters (BAQ), basic allowance for subsistence (BAS), variable housing allowance (VHA), and two allowances for overseas personnel, housing allowance (HOLA) and cost-of-living allowance (COLA).

Nurses' perceptions of working conditions are often heavily influenced by working hours. While data were not available to indicate shift rotation or number of weekends off, average hours worked per week may be a good proxy. Navy nurses are routinely expected to work more than 40 hours per week without the additional compensation that civilian nurses would receive in the form of overtime pay. In the NOTAP survey, nurses were asked to indicate the number of hours in an average work week. These responses formed a continuous variable. Responses of less than 35 or more than 168 hours were deleted as unrealistic. Although 168 hours is equivalent

to 24 hours per day, every day, this number was chosen as the cutoff. Technically, military officers are subject to recall 24 hours a day. It was felt that some of the answers on the high end of the scale may have been reflecting this fact. Other respondents may have been attempting to make a statement about their workload, since many Navy hospitals were experiencing staffing shortages during this period. Deleting those answers as unrealistic would fail to capture this information. While the response most frequently given for average work week was 50 hours, 99 nurses in the final sample gave answers above 60 hours. As the number of working hours (HOURS) increased, the probability of staying was expected to decrease.

PCPERCNT represents the amount of time nurses spend in direct contact with patients. One of the frustrations frequently expressed by nurses is that many of the activities within the job take the nurse away from bedside patient care. This variable was constructed in several steps. The 1987 NOTAP survey asked nurses to rate 755 tasks according to significance to their jobs. "Significance includes importance (e.g., to mission accomplishment), frequency of occurrence, effort exerted (mental and physical) and any other factor which contributes to a task's significance." [Ref. 47] For the present study, the sum of all tasks that were rated as

having any significance was calculated for each nurse. Next each of the 755 tasks was reviewed, and if it involved contact with patients, it was coded as such. There were 138 tasks that were classified as "patient contact" tasks. The number of patient contact tasks was calculated for each nurse. The PCPERCNT was determined by dividing the number of patient contact tasks by the total number of tasks. An increase in the percentage is expected to have a positive effect on the probability of staying.

Data for this study were collected at several different times. All data obtained from the NOTAP survey were gathered in September 1987. The data from the BUMIS files represented the most current information for each nurse as of June 1990. Therefore, the data for nurses who had left the Navy were current as of each nurse's exit date. To account for time differences, the time elapsed since the NOTAP survey (TIMSUR) was included for each nurse. TIMSUR was calculated by subtracting the survey date from the exit date for each nurse who left the Navy. The variable was measured in months. For nurses who remained on active duty, 33 months was used as the TIMSUR value. As the time elapsed since survey increases, the probability that a nurse will stay in the Navy was expected to increase, because 78 percent of the nurses remained on active



duty; therefore, the stayers had the highest values for this variable.

Consideration must be given to the possibility of bias in the study, caused by the way the data were collected. Bias could be caused by problems with either sampling or measurement. Sampling bias occurs when the sample does not adequately represent the population. It results from the sampling method. [Ref. 48] The survey recipients were selected randomly, stratified on designator codes, rank, and Navy occupational billet codes. Sampling bias could be present, due to the possibility of a self-selection bias. The group of nurses who responded to the survey may not be representative of the Nurse Corps. One way to examine representation is to compare characteristics of the sample with characteristics of the Nurse Corps. The characteristics of rank, gender, race, and educational level are readily available for comparison. Table 3.1 gives the exact figures. The sample appears to closely represent the Nurse Corps in all characteristics except educational level. Nurses with baccalaureate degrees appear to be over-represented in the sample, while nurses with masters' degrees are under-represented. This could cause a difference in survey responses, and therefore, result in bias. Since the Task Inventory survey was conducted so recently, a problem may also

exist with bias from right-censored sampling. That is, the sample will be truncated, and may tend to under-represent the leavers.

TABLE 3.1		
<u>Characteristic</u>	<u>Sample</u> (Percent)	<u>Nurse Corps</u> (Percent)
<u>Grade</u>		
ENS	19	14
LTJG	16	20
LT	30	28
LCDR	24	29
<u>Gender</u>		
Male	24.8	26
Female	75.2	74
<u>Race</u>		
Black	5.2	6
White	88.9	90.4
Other	2.4	3.6
<u>Educational Level</u>		
Diploma	12.6	11.4
BSN	82.1	70.1
MSN	5.3	13.6

Another form of bias could exist because of problems in the data measurements and variable construction. The data in the survey were self-reported. Therefore, their accuracy may vary. The length of the average work week, for example, might more closely reflect nurses' perceptions, rather than actual hours. It is also possible that the variable construction did not provide an adequate measure of the factors intended.

### C. LOGISTIC REGRESSION MODEL

A logistic regression was used to estimate the probability that a nurse would stay in the Navy, given the independent variables. The logistic model is appropriate because the dependent variable,  $Y$ , is dichotomous. The stay/leave decision was represented by 1 if the nurse remained in the Navy, and 0 if the nurse left. The dependent variable measured retention behavior as the log of the odds ratio of the probabilities of the nurse staying or leaving:

$\ln(P_i/(1-P_i))$ , a value between 0 and 1. A realistic assumption would be that the probabilities change more slowly as they approach 0 or 1. This assumption is reflected in the logistic distribution. The LOGIST procedure, from the Statistical Analysis System (SAS) Version 5.18, software package, was used to estimate the logistic regression. LOGIST fits the logistic multiple regression model to a single, binary dependent variable, by computing maximum likelihood estimates using the Gauss-Newton method.

[Ref. 49:p. 269]

The model fit by the LOGIST procedure requires the following assumptions. Let  $Y_i$  denote the dependent variable for the  $i$ th observation. Let the vector of independent variables for the  $i$ th observation be

$$X_{i1}, X_{i2}, \dots, X_{ip}$$

and

$$X_i\beta = X_{i1}\beta_1 + X_{i2}\beta_2 + \dots + X_{ip}\beta_p$$

where

$$\beta = (\beta_1, \dots, \beta_p)$$

denotes the vector of regression parameters. The assumption of the binary model is that the probability that  $Y_i=1$  is

$$1/(1+\exp(-\alpha - X_i\beta))$$

where alpha is the intercept parameter. [Ref. 49:p. 270]

Intercept terms were included in each model. Estimates of each coefficient were calculated by the maximum likelihood method. The Wald statistic was used to test the hypothesis that a parameter is equal to zero. The Wald statistic is a maximum likelihood chi-square statistic, calculated by dividing the parameter estimate by its standard error and squaring the result. For this hypothesis test, the estimators were assumed to be asymptotically normally distributed.

The coefficients of the multiple regression must be converted to elasticities in order to interpret how much the probability of staying in the Navy changes as the explanatory variables change. The elasticity of the probability of staying with respect to an explanatory variable is given by

$$\beta X(1-P_g) .$$

A positive sign on the coefficient means that an increase in that particular explanatory variable will increase the probability of staying. The magnitude of the increase is given by the elasticity.

#### IV. RESULTS

The model developed for this study assumed that nurses are utility maximizers. While both pecuniary and non-pecuniary factors contribute to utility, wages make a smaller contribution to utility for nurses than for many other people. Nurses are not income maximizers. The economic return on investment in nursing education has never been high relative to other occupations. Quality of working life is at least as important to nurses as compensation. [Ref. 1:p. 36] Therefore, in spite of lower salaries, a nurse's decision to stay in the Navy is assumed to be based more on factors contributing to job satisfaction than it is on salary. The nurse will stay if the utility derived from the Navy nursing position is perceived to be higher than the potential utility from a civilian nursing job. Using various determinants of job satisfaction, personal characteristics, and a measure of civilian nursing labor market demand, the probability of staying was specified as:

$$\ln \left( \frac{P_s}{1-P_s} \right) = \beta_0 + \beta_1 \text{REGVAC} + \beta_2 \text{REGVAC}^2 + \beta_3 \text{PCPERCNT} \\ + \beta_4 \text{PAY} + \beta_5 \text{HOURS} + \beta_6 \text{TIMSUR} + \mu$$

where

$P_s$  = probability of staying  
 REGVAC = regional hospital nurse vacancy rates  
 REGVAC<sup>2</sup> = vacancy rates squared  
 PCPERCNT = percent of patient contact tasks  
 PAY = actual pay and allowances  
 HOURS = average hours worked per week  
 TIMSUR = time elapsed since NOTAP survey

Table 4.1 gives some descriptive statistics for the specified variables. Regional vacancy rates varied widely across the country, from a high of 11.3 percent in the Atlantic region to a low of 4.0 in the West North Central region. However, for the nurses in the sample, the lowest vacancy rate was 7.6, the national average used for nurses in overseas duty stations. Percent of patient contact tasks also had a high degree of variation. The lower end of the percentage scale most likely represents nurses in administrative or nursing education positions, where patient contact is often minimal. The pay variation came from several sources. It represents longevity and rank progression as well as housing and cost-of-living allowances, which are location dependent. Although the range of hours was large, only 99 nurses gave responses greater than 60 hours, and the most

TABLE 4.1

Descriptive Statistics for Variables				
Variables	Mean (Standard Error)	Mode	Minimum Value	Maximum Value
REGVAC	10.72 (.046)	10.8	5.7	11.3
REGVAC <sup>2</sup>	116.12 (.823)	113.64	32.49	127.69
POPERCNT	0.41 (.007)	0.50	0	0.97
PAY	2647.33 (29.695)	1627	1374	4731
HOURS	54.71 (.501)	50	40	156
TIMSUR	29.46 (.326)	33	2	34

frequent response was 50 hours, which is very close to the mean, 54.71. Time elapsed since the survey ranged from two to 34 months. The mean was high, because 78 percent of the sample remained on active duty.

In developing the model specification, several other variables that the literature review suggested would have an influence on the stay or leave decision were examined. These included repetitiveness of the job, promotion opportunities, educational level, age, job tenure, kinship responsibilities, gender, race, and staff-to-patient ratios. Problems were



initially encountered with multicollinearity, due to the close relationships between some of these variables. Other variables from this list, such as gender, race and educational level, were simply not significant in the model. The behavior of the model that included these variables indicated that the model was mis-specified. With the variables included, the Wald chi-square statistics for all variables were too low to be of any significance. Consequently, the variables were dropped. The lack of significance of these variables does not indicate that they do not influence the stay or leave decision of Navy nurses, because problems with measurement error or sampling bias may characterize this sample.

The actual results were close to those hypothesized, although there were some unexpected findings. Table 4.2 shows the coefficients and their significance levels. The influence of vacancy rates was not a linear function. Instead, followed a parabolic curve, increasing up to a certain point, and then decreasing. This necessitated the inclusion of vacancy rates squared. The point at which the influence changes from positive to negative occurs at a vacancy rate of approximately 11 percent. The chi-square values for the Wald test of statistical significance for the vacancy rate coefficients are absent from Table 4.2, because the SAS LOGIST program suppresses the use of the standard error under certain

TABLE 4.2

Results of Logistic Regression				
Variable	Beta	Standard Error	Chi-Square	P
Intercept	-95.379	33.17	8.27	0.004
REGVAC	1.097	.	6.14 <sup>a</sup>	0.05
REGVAC <sup>2</sup>	-0.050	.		0.05
PCPERCNT	-6.268	3.56	3.10	0.08
PAY	0.002	0.0009	4.29	0.04
HOURS	-0.049	0.026	3.51	0.06
TIMSUR	2.886	.	444.71 <sup>b</sup>	0.001
Model Chi-Square: 526.36		-2 Log Likelihood: 55.74		
<sup>a</sup> Likelihood ratio test for hypothesis that REGVAC=REGVAC <sup>2</sup> =0				
<sup>b</sup> Likelihood ratio test for hypothesis that TIMSUR=0				

conditions. If the standard error estimate of the parameter being tested is very large, the Wald statistic can produce undesirable results.

...when applied to logit analysis, Wald's test can behave in an aberrant manner, yielding apparently insignificant results when the likelihood ratio test strongly suggests rejecting the null hypothesis.  
 [Ref. 50:p. 170]

The likelihood ratio test for the hypothesis that the vacancy rate parameters were jointly equal to zero indicated that the

hypothesis could be rejected at the five percent significance level.

Percent of patient contact tasks definitely had an unexpected influence. The hypothesized influence was positive, meaning that as the percent of contact with patients increased, the probability of staying was expected to increase as well. The actual effect was just the opposite. It had a negative influence, with a significance level of 0.08. There are two possible explanations for this result. First of all, it is possible that the percentage is actually a measure of workload, in which case the negative sign would make sense. This would be true if, for example, the number of tasks involving patient contact were increasing without a corresponding decrease in non-patient contact tasks. Another, more plausible, explanation may be that the incentive structure in the Nurse Corps does not encourage nurses to remain in the patient care areas. Career development guidelines influence nurses to move into leadership and management positions, which take them away from the bedside. It is also important to remember that the percentage value is a function of how many task questions were present in the survey, of how those question were asked, and finally, of how the tasks were classified as patient contact or non-patient contact.

The remaining three variables all affected the probability of staying in the hypothesized directions. Pay had the expected positive influence, with a significance level of 0.03. The fact that pay had a significant influence in this study, when it seldom did in the literature, could have several meanings. Firstly, no attempt was made to separately capture the influence of the retirement annuity available to Navy nurses. The present value of that annuity would differ from individual to individual, because each values time differently, and also because each is at a different stage of her career. Including retirement separately was beyond the scope of this thesis. Pay is also inextricably intertwined with promotion in the military. While promotion opportunities were not significant in this model, the pay variable may be reflecting some of the influence of the promotion system. Finally, the significance of pay here might reflect changing issues in the nursing profession. This nursing shortage has been acutely felt by hospitals and has received a great deal of attention. Pay scales have started to climb in many areas of the country in response to the shortage. Nurses also have more opportunities outside of hospitals as health care continues to change. Pay may now be a salient issue, where it may not have been in the past.

Hours were significant at the 0.06 level, with a negative influence on probability. It is noteworthy that the average hours per week were measured before nurse staffing shortages induced many Navy hospitals to implement various combinations of 12-hour shifts. The measurement used in the present study did not capture the effect of the extended hours. That effect would not necessarily have a negative influence on probability. The longer shifts, in many cases, provided higher staff-to-patient ratios, and therefore, may have reduced workload. However, the uncompensated overtime hours at the time of the survey apparently had a negative influence on retention.

The time elapsed since the survey had a positive influence and was highly significant. The SAS program suppressed the Wald test chi-square value for this variable, but a likelihood ratio test indicated a significance level of 0.001. The fact that time since survey was significant indicated that the timing differences in the data collection were important. Time since survey is also closely related to other variables initially tested in the model, such as job tenure and age. Therefore, the time variable may be absorbing some of the effects of other factors that influence probability.

Although the sign on the coefficient can be interpreted as the direction of influence on the probability of staying, the

size of the coefficient does not indicate the magnitude of the influence. The magnitude may be determined by calculating the elasticity for a theoretical, or notional case. It is also helpful to view the results graphically, in terms of the notional case. The case used here will be for a nurse stationed on the West Coast, where the vacancy rate was 11.3 percent. Patient contact tasks for this notional nurse are 48 percent of her total tasks. She receives \$2800 pay each month, and works an average of 53 hours per week. Time elapsed since the survey was 31 months, meaning the nurse left the Navy 31 months after she took the survey.

Table 4.3 shows the variable elasticities for this nurse. The effect of the vacancy rate parameters is probably best demonstrated graphically. Figure 4.1 demonstrates the shape of the influence of vacancy rates for this nurse. The greatest change in probability occurs at vacancy rates of 15 to 18 percent. The influence for this nurse is at the turning point, which means that if the vacancy rate increases, all other factors held constant, her probability of staying in the Navy will decrease.

TABLE 4.3

Variable Elasticities for the Notional Case			
<i>Elasticity</i> = $\beta X_i (1 - P_{stay})$			
$P_{stay} = .51$			
Variable	Coefficient	X Value	Elasticity
REGVAC	1.097	11.3	6.07
REGVAC <sup>2</sup>	-.05	127.69	-3.13
PCPERCNT	-6.268	.48	-1.47
PAY	.002	2800	2.74
HOURS	-.05	53	-.30
TIMSUR	2.886	31	.84

### Influence of Vacancy Rates on Notional Case

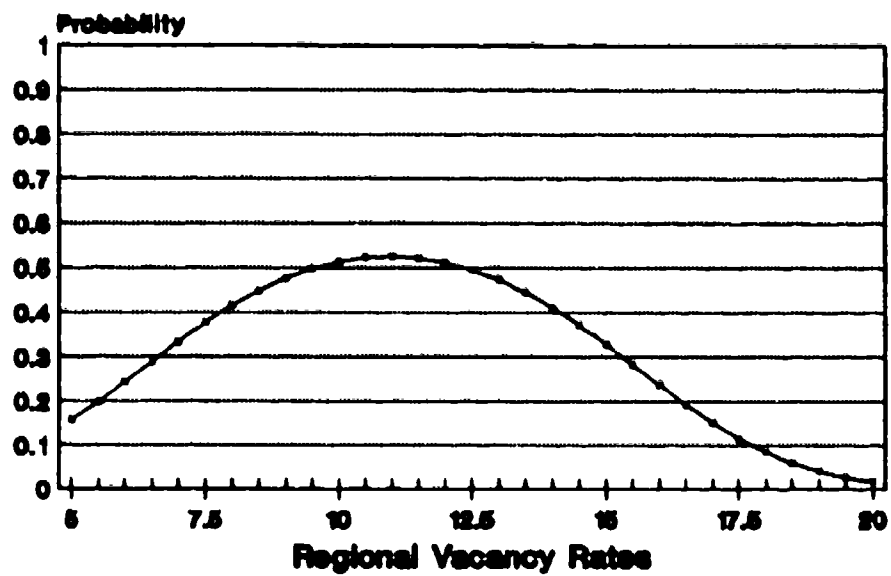


Figure 4.1



The influence of patient contact tasks is illustrated in Figure 4.2. The negative influence on probability can be clearly seen as patient contact increases. The elasticity of -1.47 from Table 4.3 means that if patient contact increased by one percent, the probability of staying would decrease by 1.47 percent.

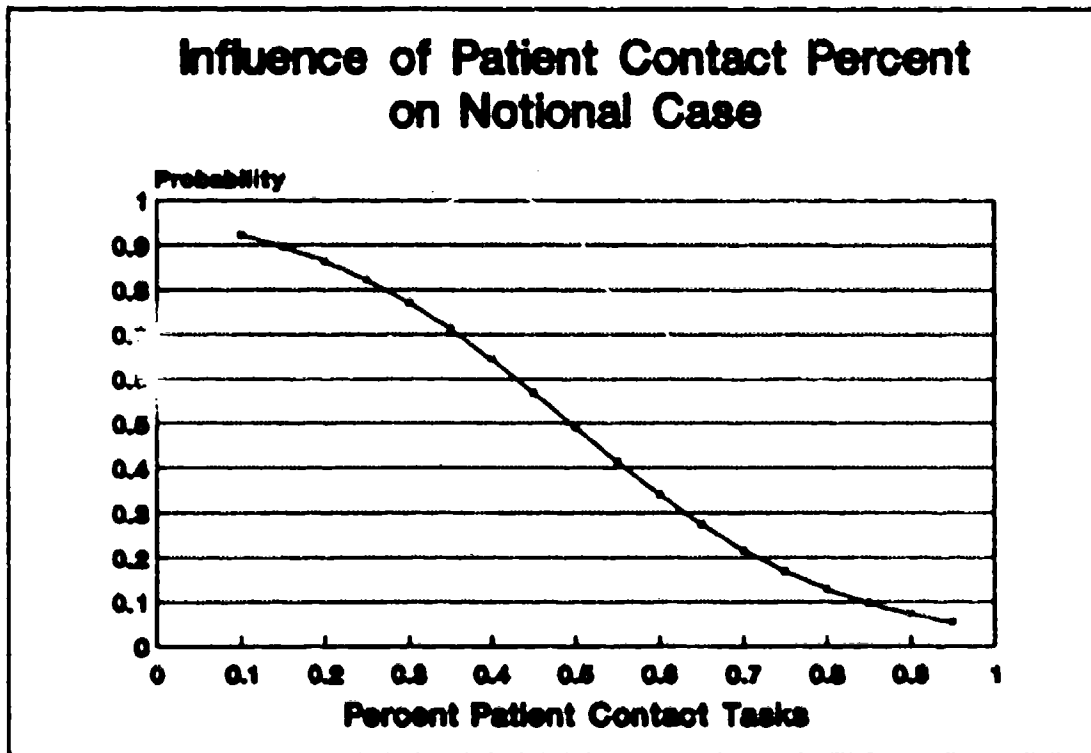


Figure 4.2

Figure 4.3 illustrates the influence of pay on the notional case. The elasticity for the pay variable was 2.39. If this nurse's pay increased by one percent of the pay range of nurses in the study, her probability of staying would increase by 2.39 percent. The shape of the pay curve reveals that the strongest influence on probability for this particular nurse is in the pay range of approximately \$2200 to \$3500.

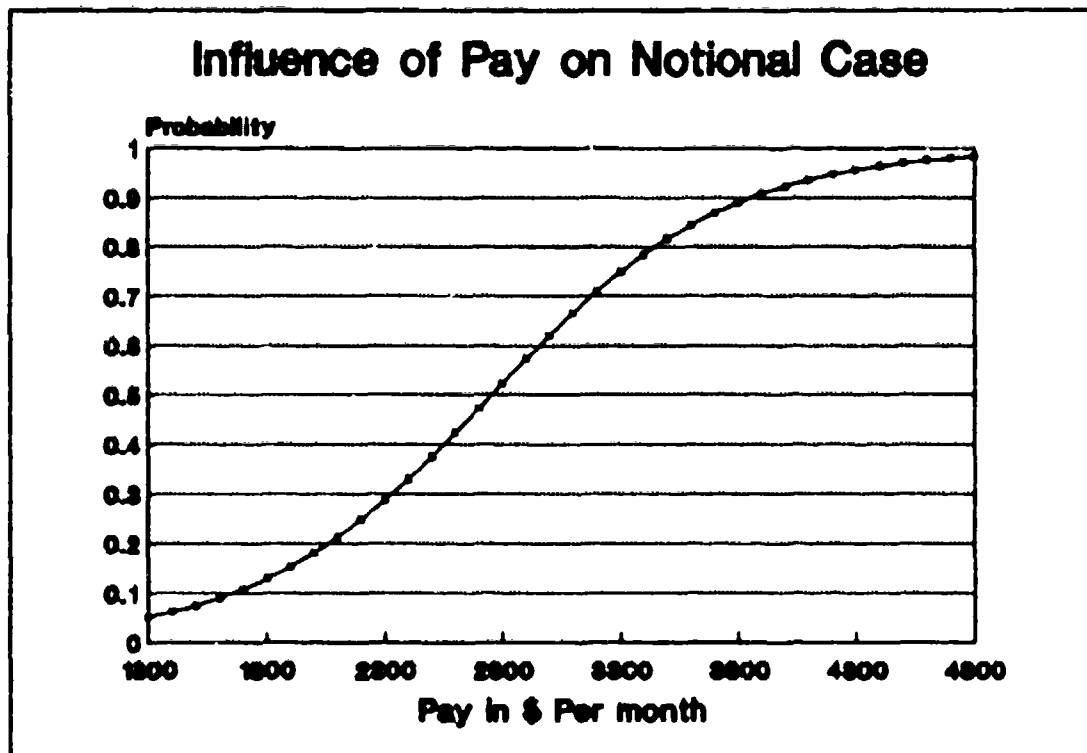


Figure 4.3

As shown in Figure 4.4, hours have a fairly linear, negative influence on the probability of staying. The elasticity of hours from TABLE 4.3 is -1.3. If number of hours increased by one percent, the probability of staying would decrease by 1.3 percent.

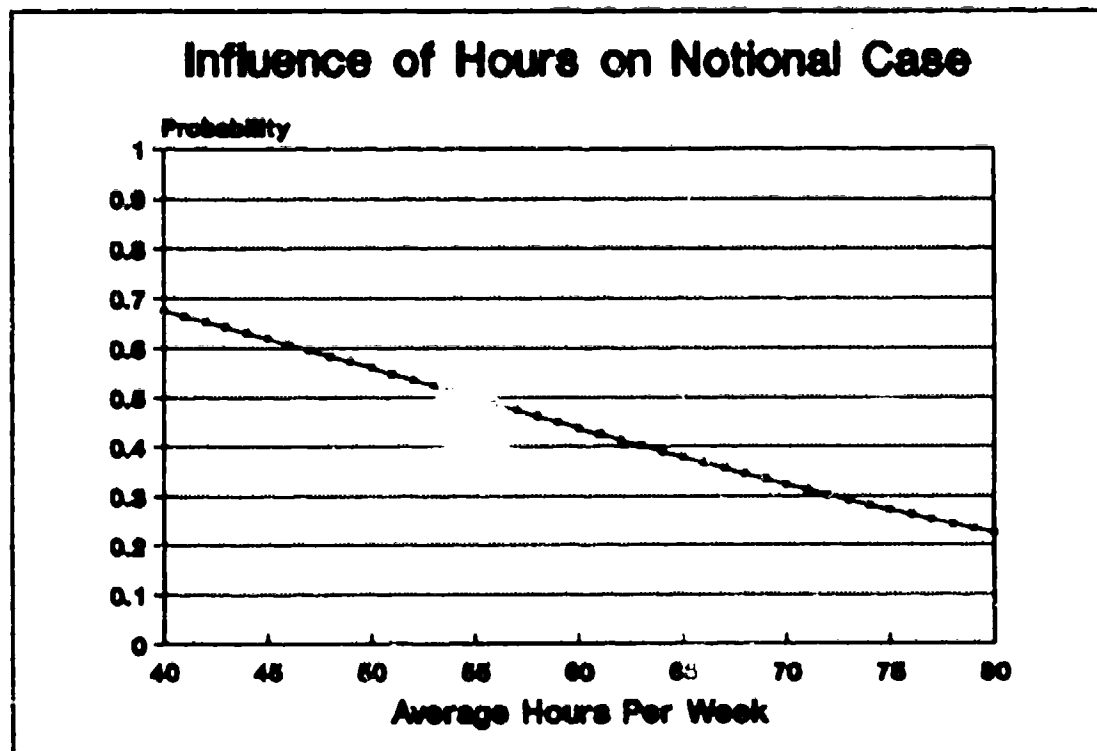


Figure 4.4

Specific changes in the probability values, given certain changes in the characteristics are calculated in Table 4.4. The fourth case in the table is the notional case discussed above. It is interesting to note that a reduction in the percent of patient contact tasks by one-half, along with a pay increase of \$700 per month virtually assures that the nurse will stay. However, caution must be used when interpreting these results. The pay increase and change in job composition are events that normally occur with rank progression and job tenure. The effect of these factors may have been absorbed in

TABLE 4.4

Retention Probability Calculations Probability nurse will stay ( $P_{STAY} = 1$ )						
Variable	Characteristics of Nurse					
REGVAC	11.3					10.3
PCPERCNT	.65		.48			.25
PAY	2500			2800	3100	3500
HOURS	58	53				55
TIMSUR	31					31
$P_{STAY}$	.13	.16	.36	.51	.65	.94

the time since survey variable. In fact, the elasticity of TIMSUR for the notional nurse, from Table 4.3, is extremely large (43.84). If the time since survey increases from 31 to 32 months for this nurse, her probability of staying increases from .51 to .95. It does not seem plausible that merely remaining on active duty one more month could make that much difference in the probability a nurse would stay.

As shown in Table 4.5, the model predicted stayers and leavers with a high degree of accuracy. Since 78 percent of the nurses in the sample remained on active duty, 0.78 is the probability level used to predict that a nurse will stay. The sensitivity value is the proportion of the stayers predicted by the model that agrees with the true state. The specificity is the proportion of leavers that agrees with the true state. This model predicted 99.5% of the true stayers and 95.9% of the true leavers.

TABLE 4.5

Prediction Results			
Predicted			
		Negative	Positive
True	Negative	118	5
	Positive	2	422
	Total	120	427
Sensitivity: 99.5%		Specificity: 95.9%	
False Positive Rate: 1.2%		False Negative Rate: 1.7%	

## V. CONCLUSIONS AND RECOMMENDATIONS

### A. DISCUSSION OF FINDINGS

This thesis examined the influences on retention for Navy nurses. The primary purpose of the study was to determine what factors influence the stay or leave decisions of nurses in the first four grades. Specific areas of interest were pay and working conditions.

Several factors had a significant influence on the probability that a nurse will stay in the Navy. Hospital nursing vacancy rates had a positive influence, until the rates climbed to approximately 11 percent. The influence then became negative, and thus adversely affected retention. As the amount of patient contact (as a percentage of overall job tasks) increased, the probability that a nurse will stay decreased. This effect may be due to insufficient rewards for nurses to remain in patient care areas. Promotion becomes difficult for nurses who do not move into leadership and management positions. Increasing pay had a positive effect on retention. The influence of pay was not separated from those of promotion or retirement. Longer working hours apparently encouraged nurses to leave the Navy. Here again, the reward

system may be insufficient for large amounts of uncompensated overtime.

Another significant finding, apart from the influences on retention, was the importance of the timing of data collection. The 2 1/2 to 3 year lag in some of the data may have resulted in several factors becoming irrelevant for this model. Time since survey essentially became a correction factor. It appears that this variable absorbed the influence of other variables that did not prove significant. However, the significance of this variable may also represent an adaptation process: as nurses adjust to the Navy culture, they become less likely to leave. In fact, there did appear to be a turning point, where the effect of remaining one more month substantially increased the probability of staying. It may be that this turning point represents the end of an obligation or a tour of duty. If so, this point could be a critical time for the Nurse Corps to influence retention.

The Nurse Corps force structure is required to have essentially the same pyramid shape as other Navy communities. This pyramid shape is becoming difficult to maintain during the current nursing shortage. Recruiting difficulties are resulting in too few nurses in the lower grades. Increasing losses of nurses at the end of their first obligations are



causing a gap to develop in the force structure at the middle grades.

The emphasis in the past appears to have been entirely on recruiting. With continuation rates consistently above 90 percent, it has been possible to maintain the size of the Nurse Corps by adjusting recruiting goals. The decline in continuation rates necessitates a shift in focus; retention must be emphasized as well.

#### B. RECOMMENDATIONS

The development of retention goals for each grade could help clarify some of the manpower issues the Nurse Corps is currently facing. Retention goals must take into account projected recruiting and promotion totals, as well as policy changes in those areas. The Nurse Corps recently acquired a tool that could be used to calculate retention goals. The interactive computer model, FORCE, was developed at the Naval Postgraduate School, Monterey. The model can be used to forecast future officer distributions by grade and years of service. [Ref. 51]

The Nurse Corps may be able to improve retention by examining the factors shown by this thesis to have a negative influence on the stay or leave decision. The incentive structure for nurses in patient care areas would be a good

starting place. It may also be helpful to study workload, at least in terms of hours. Further research on retention influences for each rank would be useful to the Nurse Corps. Although it was beyond the scope of this thesis, the study indicated that the factors that influence retention change as rank progresses. Further study could help specify which factors would yield the greatest increase in retention for nurses at the end of their first obligations.

Another potential area for improving retention is pay. Since pay was significant, it may possible to use it as a retention incentive. Targeted retention bonuses at the end of the first obligation might prove beneficial for the Nurse Corps. Further research could help delineate the influence of pay and determine the feasibility of such bonuses.

A specific study of job satisfaction could prove beneficial for the Nurse Corps. The data were not available to measure job satisfaction in this study. However, an established measurement tool exists in the survey that the Air Force Nurse Corps periodically uses to measure job satisfaction and career intentions of its nurses. This survey could provide useful data without the need for the Nurse Corps to spend resources on developing its own separate survey.

Further research would provide the Nurse Corps with valuable information about targeting its retention

initiatives. This thesis provides the groundwork for such research, and it also provides a more immediate focus for retention efforts in the meantime.

#### LIST OF REFERENCES

1. Aiken, Linda H., "The Nurse Labor Market," Health Affairs, Fall 1982.
2. Aiken, Linda H. and Mullinix, Connie F., "The Nursing Shortage: Myth or Reality?" New England Journal of Medicine, Vol. 317, no. 10 (1987), p. 642.
3. Russell, Louise B., Medicare's New Hospital Payment System: Is it working?, The Brookings Institution, Washington, D.C., 1989.
4. Inglehart, John K., "Problems Facing the Nursing Profession," New England Journal of Medicine, Vol. 317, no. 10 (1987), p. 647.
5. Secretary's Commission on Nursing, Interim Report, July 1988.
6. Editors, "Nursing Shortage Poll Report," Nursing 88, Vol. 18, no. 2, (1988), p.32.
7. American Hospital Association, The Nursing Shortage: Facts, Figures, and Feelings, AHA Catalog No. 154100, 1987.
8. Nelson, Soraya, "CHAMPUS broke for 6th straight year," Navy Times, 21 May 1990, p.4.
9. Information obtained from LCDR Ellen Quisenberry, Nurse Corps Personnel and Plans Analysis, Bureau of Medicine and Surgery, Washington, D.C.
10. Cooke, Timothy W., Navy Nurse Retention: FY '1974 to FY 1988, Center for Naval Analysis, July 1988.
11. Cymrot, Donald J., Memorandum for the Deputy Chief of Naval Operation (Manpower, Personnel and Training) (OP-01), Subject: Nurses Continuation in FY 1989, Center for Naval Analysis, 4 May 1990.

12. Hilton, Thomas F., Individual, Organizational, and Job Factors Affecting Quality of Work Life Among Navy Nurse Corps Officers, Naval School of Health Sciences, Bethesda, MD, (1987).
13. Bureau of Medicine and Surgery, "1987-1989 Nurse Corps Retention Initiatives," Ser. 00NC/2529n, November 1989.
14. Beyers, M., Mullner, R., Byre, C., and Whitehead, S., "Results of the Nursing Personnel Survey, Part 2: RN Vacancies and Turnover," The Journal of Nursing Administration, Vol. 13, No. 5, pp. 26-31, May 1983.
15. Lensing, Susan B., A Model of Career Orientation for Military Nurse Corps Officers, Master's Thesis, Naval Postgraduate School, Monterey, California, December 1984.
16. Jones, Cheryl B., "Staff Nurse Turnover Costs: Part I, A Conceptual Model," Journal of Nursing Administration, Vol. 20, No. 4, pp. 18-22, April 1990.
17. Jones, Cheryl B., "Staff Nurse Turnover Costs: Part II, Measurements and Results," Journal of Nursing Administration, Vol. 20, no. 5, pp. 27-32, May 1990.
18. Mann, Everett E., "A Human Capital Approach to ICU Nurse Retention," Journal of Nursing Administration, Vol. 19, No. 10, pp. 8-16.
19. Muchinsky, Paul M., Psychology Applied to Work, 2d ed., Brooks/Cole Publishing Company, 1989.
20. Lowell, Richard W., An Analysis of the Factors Affecting the Career Orientation/Turnover Behavior of Female Naval Officers, Masters' Thesis, Naval Postgraduate School, Monterey, California, December 1987.
21. Mowday, Richard T., Porter, Lyman W., and Steers, Richard M., Employee-Organization Linkages: The Psychology of Commitment, Absenteeism and Turnover, Academic Press, 1982.
22. Steers, Richard M., "Antecedents and Outcomes of Organizational Commitment," Administrative Science Quarterly, Vol. 22, pp. 46-56, March 1977.

23. Lindner, Thomas E. and Davis, Mark E., A Comparative Analysis of Factors Affecting the Career Orientation of Naval Officers and Federal Civilian Engineers, Master's Thesis, Naval Postgraduate School, Monterey, California, 1989.
24. Michaels, Charles E. and Spector, Paul E., "Causes of Employee Turnover: A Test of the Mobley, Griffith, Hand, and Meglino Model," Journal of Applied Psychology, Vol. 67, No. 1, pp. 53-59, 1982.
25. Mobley, William H., "Intermediate linkages in the Relationship between Job Satisfaction and Employee Turnover," Journal of Applied Psychology, Vol. 62, No. 2, pp. 237-240, 1977.
26. Mobley, William H., Horner, Stanley O., and Hollingsworth, A.T., "An Evaluation of Precursors of Hospital Employee Turnover," Journal of Applied Psychology, Vol. 63, No. 4, pp. 408-414.
27. Miller, Howard E., Katerberg, Ralph, and Hulin, Charles L., "Evaluation of the Mobley, Horner, and Hollingsworth Model of Employee Turnover," Journal of Applied Psychology, Vol. 64, No. 5, pp. 509-517, 1979.
28. Dalessio, A., Silverman, W.H., and Schuck, J.R., "Paths to Turnover: A Re-analysis and Review of Existing Data on the Mobley, Horner, and Hollingsworth Model," Human Relations, Vol. 39, No. 3, pp. 245-263, 1986.
29. Price, James L. and Mueller, Charles W., "A Causal Model of Turnover for Nurses," Academy of Management Journal, Vol. 24, No. 3, pp. 543-565, 1981.
30. Hinshaw, Ada S., Smeltzer, Carolyn H., and Atwood, Jan R., "Innovative Retention Strategies for Nursing Staff," Journal of Nursing Administration, Vol. 17, No. 6, pp. 8-16, June 1987.
31. Choi, Thomas, Jameson, Helen, Brekke, Milo L., Anderson, James G., and Podratz, Rosalyn O., "Schedule-Related Effects on Nurse Retention," Western Journal of Nursing Research, Vol. 11, No. 1, pp. 92-107, February 1989.
32. Benedict, M. Beth, Glasser, Jay H., and Lee, Eun S., "Assessing Hospital Nursing Staff Retention and Turnover:

A Life Table Approach," Evaluation and the Health Professions, Vol. 12, No. 1, pp. 73-96, March 1989.

33. Blegan, Mary A. and Mueller, Charles W., "Nurses' Job Satisfaction: A Longitudinal Analysis," Research in Nursing and Health, Vol 10, pp. 227-237, 1987.
34. Prescott, Patricia A., "Vacancy, Stability and Turnover of Registered Nurses in Hospitals," Research in Nursing and Health, Vol. 9, No. 1, pp. 51-60, 1986.
35. Kostreva, Michael M. and Genevier, Pierre, "Nurse Preferences vs. Circadian Rhythms in Scheduling," Nursing Management, Vol. 20, No. 7, pp. 50-62, July 1989.
36. Harvey, Brian J. and Hannah, T. Edward, "The Relationship of Shift Work to Nurses' Satisfaction and Perceived Work Performance," Nursing Paper/Perspectives on Nursing, Vol. 18, No. 4, pp. 5-14, 1986.
37. Barhyte, Diana Y., Counte, Michael D., and Christman, Luther P., "The Effects of Decentralization on Nurses' Job Attendance Behaviors," Nursing Administration Quarterly, Vol. 11, No. 4, pp. 37-46, Summer 1987.
38. Neathawk, Roger D., Dubuque, Susan E., and Kronk, Carolyn A., "Nurses' Evaluation of Recruitment and Retention," Nursing Management, Vol. 19, No. 12, pp. 38-45, December 1988.
39. Cymrot, Donald J., Memorandum for the Deputy Chief of Naval Operation (Manpower, Personnel and Training) (OP-01), Subject: Nurses Continuation in FY 1989, Center for Naval Analyses, 4 May 1990.
40. United States Air Force Nurse Corps, Vital Signs: A Survey of the United States Air Force Nurse Corps, May 1988.
41. Director, Navy Nurse Corps, Nurse Corps Information Update, Bureau of Medicine and Surgery, Washington, D.C., January 1990.
42. Thomas, George W. and Kocher, Kathryn M., A Retention Model for Army Nurses, Naval Postgraduate School, Monterey, California, January 1990.

43. Shigley, Eleanor M., An Analysis of Factors Affecting the Career Plans of Military Nurses, Masters Thesis, Naval Postgraduate School, Monterey, California, December 1988.
44. Kamin, Deborah Y., Data Set Design and Scatterplots, University of Maryland, College Park, Maryland, April 1990.
45. Cooke, Timothy W., Navy Nurse Corps Compensation, Center for Naval Analyses, September 1989.
46. Department of Health and Human Services, Secretary's Commission on Nursing, (Support Studies & Background Information), Vol. 2, December 1988.
47. Navy Occupational Development and Analysis Center, Occupation Analysis Report: Medical Department Officers, June 1989.
48. Lapin, Lawrence, Statistics for Modern Business Decisions, 2nd edition, Harcourt, Brace, Jovanovich, Inc., 1978.
49. SAS Institute Inc., SUGI Supplemental Library User's Guide, Version 5 Edition, Cary, NC: SAS Institute Inc., 1986, 662 pp.
50. Anderson, Sharon, Auquier, Ariane, Hauck, Walter, Oakes, David, Vandaele, Walter, and Weisberg, Herbert, Statistical Methods for Comparative Studies, John Wiley & Sons, Inc., 1980.
51. Doyle, Karen A., Future Navy Nurse Corps Grade Distributions: An Analysis of the Impact of Relief from Constraints Imposed by the Defense Officer Personnel Management Act of 1981, Master's Thesis, Naval Postgraduate School, Monterey, California, December 1989.



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